AN EGYPTIAN OASIS

H. J. LLEWELLYN BEADNELL

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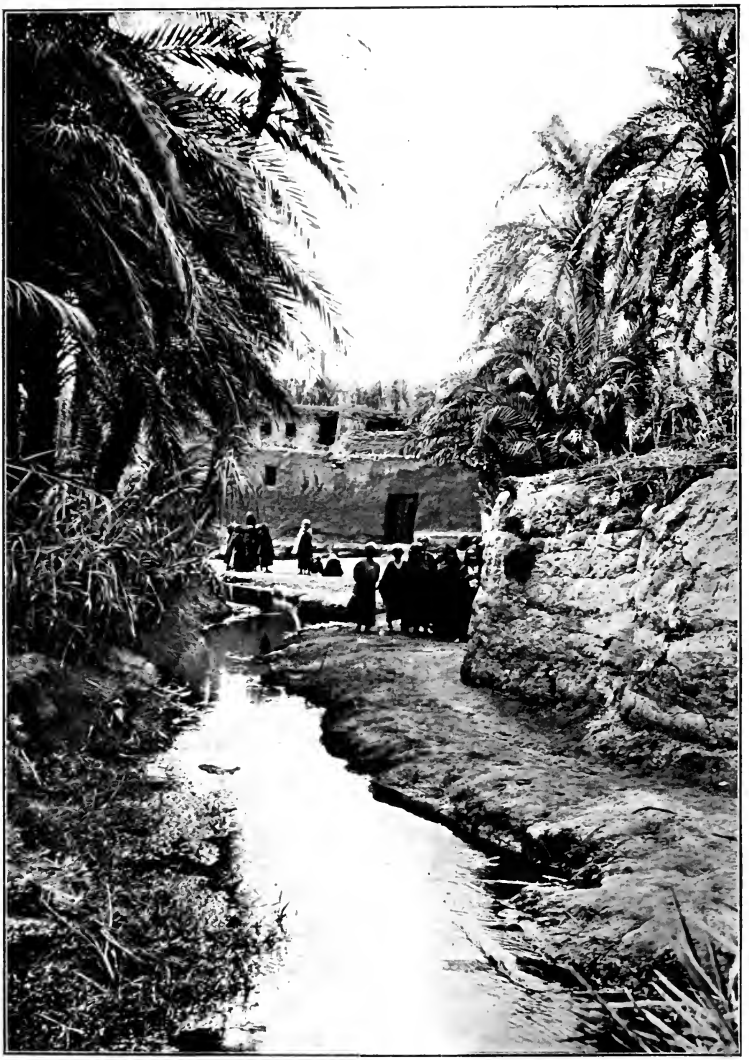

AIN ESTAKHERAB, GENNAH.

Frontispiece.

AN EGYPTIAN OASIS

AN ACCOUNT OF THE OASIS OF KHARGA IN THE LIBYAN DESERT, WITH SPECIAL REFERENCE TO ITS HISTORY, PHYSICAL GEOGRAPHY, AND WATER-SUPPLY

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FORMERLY OF THE GEOLOGICAL SURVEY OF EGYPT

WITH MAPS AND ILLUSTRATIONS

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TO THE

MEMORY OF A FRIEND AND FELLOW-GEOLOGIST,

THOMAS BARRON,

WHO LOST HIS LIFE IN THE SUDAN

IN FEBRUARY, 1906

PREFACE

THE inhabited depressions of the Libyan Desert, called by Herodotus the 'Islands of the Blest,' are interesting alike to the archæologist, to the geographer and geologist, and to the tourist who wishes to wander from the well-beaten tracks, and perhaps none more so than the Oasis of Kharga, lying 130 miles west of Luxor—the site of ancient Thebes—and recently connected by railway with the Nile Valley.

Descended from the ancient Libyans, the inhabitants of the Egyptian oases (numbering over 30,000 souls) are quite distinct from the Fellahin and Bedawin of the Nile Valley. Isolated by arid and desolate wastes, these communities occupy quaint walled-in towns and villages, tucked away among groves of palms, interspersed with smiling gardens and fields of corn. Rain is almost unknown, and rivers are non-existent, the trees and crops being irrigated by bubbling wells, deriving their waters from deep-seated sources.

Kharga—the subject of the present memoir—

formed part of the Great Oasis of ancient days, and was governed in turn by the Pharaohs, the Persian Monarchs, and the Roman Emperors. Through it the ill-fated army of Cambyses is recorded to have marched, and in it is to be seen the most important Persian monument in Egypt, the temple of Hibis. But most interesting of all is the wonderfully preserved Early Christian necropolis, dating from the time of Bishop Nestorius, who was banished to Kharga in A.D. 434. Juvenal, Athanasius, and other celebrities likewise appear to have made unwilling acquaintance with this portion of the Roman Empire.

The character of the people at the present day—a curious mixture of stupidity, apathy, and shrewdness—seems to reflect in great measure their past history, as well as the peculiar conditions under which they still live. A history of the inhabitants since the withdrawal of the Roman garrisons would resolve itself into an account of an endless combat with Nature, which, with sand and wind as its chief agents, has never abated its efforts to recover those tracts which the Ancients, by the exercise of much skill and industry, wrested from the desert.

As a member of the Geological Survey of Egypt from 1896 to 1905, I spent nearly nine years in survey and exploration work in the Egyptian deserts, and for the past three years I have been in charge of extensive boring and land-reclamation

operations in the particular oasis with which this book deals, so that I have had exceptional opportunities of studying at first hand a region of peculiar interest. Among other questions dealt with are the vast systems of subterranean aqueducts constructed by the Romans; the extensive lakes which occupied the floor of the oasis-depression well into historic times; the rate and mode of movement of desert sand-dunes; the formation and gradual elevation of the cultivated terraces by the constant accumulation of wind-borne material; and the deep-seated water-supplies, a subject which, in view of recent discussions as to the origin of the artesian waters of arid regions, is of more than local interest.

Some portions of the book, more especially those dealing with geology and water-supply, have already been published in somewhat different form in the *Geological Magazine*, and I am indebted to Dr. Henry Woodward, F.R.S., for permission to reproduce them, as well as the plate showing Bore No. 39 and the geological section across the oasis.

The illustrations are reproduced from photographs taken by me at different times during the last few years. The maps, showing the relative positions of the oasis and the Nile Valley, the caravan roads, and the geology, have been compiled from all available published material, chiefly the work of Dr. John Ball and myself. Some portions of these, as well as the plan showing

the subterranean aqueducts of Um El Dabâdib, are now published for the first time. The caravan routes, while shown with sufficient accuracy for all practical purposes, have not been surveyed with the same degree of exactness as the other details shown on the maps.

H. J. LLEWELLYN BEADNELL.

London,
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No more striking contrast can be imagined than that between the intensely cultivated Valley of the Nile and the barren deserts on either side. There are arid wastes in many parts of the world—in Australia, in the Western States of America, in Asia—but in point of desolateness, in the absence of animal and vegetable life, there is probably nothing to rival the greater portion of the Libyan Desert, on the west side of the Nile. Its barrenness is aggressive; it is not necessary to travel far to make its acquaintance; so sharp is the junction that, in a single step, one may pass from the richly cultivated alluvial soil of the Nile to the bare sandy plains which skirt the more rocky interior of the desert. Along the borders of the

Egyptian wastes one generally looks in vain for the Persian poet's

> "Strip of herbage strown,
> That just divides the desert from the sown."

Geographically the Libyan Desert is the eastern and most inhospitable portion of the Sahara, or Great Desert of Africa. On the north and east its boundaries are clearly defined by the Mediterranean Sea and the Valley of the Nile; on the south it is bounded by the Darfur and Kordofan regions of the Egyptian Sudan; to the south-west its limits may be regarded as coterminous with the elevated districts of Tibesti; while on the west it stretches to the outlying oases of Fezzan and Tripoli. Its area is about 850,000 square miles, or approximately seven times that of the British Isles.

With the exception of a narrow belt fringing the Mediterranean, the region is, to all intents and purposes, rainless, the occasional thunderstorms being extremely local, and seldom breaking over the same district in two consecutive years. In the more elevated deserts on the eastern side of the Nile rains appear to be of sufficiently frequent occurrence to maintain a water-supply in the isolated water-holes and valley-springs, and to allow of the growth of a fairly permanent though scanty herbage in the more favoured areas. The Eastern desert does, therefore, to some extent, support a migratory Arab population. On the other hand, the greater portion of the Libyan

Desert is quite devoid of vegetation and water-holes, and is, in consequence, uninhabited even by nomad tribes. At the same time, the extreme barrenness of the region as a whole is in great measure counterbalanced by a number of isolated fertile oases, in which there is a permanent resident population, deriving its water-supplies entirely from underground sources.

The term 'oasis,' an ancient Egyptian word signifying a resting-place, in its strict sense means a fertile spot in a desert, but in Egypt has usually been applied to a depression as a whole, each individual cultivated area being known by the name of the well from which its water is derived. The chief groups of oases in the Libyan Desert are the Siwan on the north, that of Kufra on the west, and the Egyptian, including the four large oases of Baharia, Farafra, Dakhla, and Kharga, on the east. The present volume deals more especially with the last of these.

The Libyan Desert is primarily divisible into two entirely different parts, distinguished by the presence or absence of surface accumulations of blown sand. Extensive dunes are confined to the western portion, where areas of hundreds of square miles are literally buried under deep seas of sand, blown into more or less parallel dunes of great height, lying N.N.W. and S.S.E., in the direction of the prevailing winds. In this country it is almost impossible to travel in a latitudina direction, so that the sand-covered area forms an

effective barrier between the Egyptian oases and Kufra, one of the strongholds and, at any rate until recently, the headquarters of the powerful Senussi sect. It is probable that, within the last century, the area of this sand has extended considerably to the south, as an old caravan road trending westwards, and believed to have originally connected the oases of Dakhla and Kufra, is now lost in the dunes. As long ago as 1874 some of the members of the Rohlfs expedition made an attempt to penetrate westwards from Dakhla, but on reaching the edge of the great sand-region, about 170 kilometres W.S.W. of Qasr Dakhl, were compelled to turn northwards and travel in a direction parallel to the lines of dunes, from which they emerged, after a long and wearisome journey of 400 kilometres, in the neighbourhood of the oasis of Siwa. Outlying portions of this sand invade the Egyptian oases; for instance, the depression of El Daila, lying to the west of Farafra, is to a great extent filled with blown sand, while an extensive area in the south of Farafra itself is buried under dunes.

On the eastern portion the sand is for the most part confined to isolated lines of dunes, the most remarkable being that known as the Abu Mohariq. This commences in latitude 29° 45′ north, at Arûs el Buqar, some 50 kilometres south-west of the Mogara swamp, in the low country to the south of the great east and west Miocene escarpment. From Arûs el Buqar the Abu Mohariq sand-belt

runs in an almost straight and unbroken line across the Libyan plateau to the oasis of Kharga, through which it continues into the desert to the south. The average breadth of this line of dunes is only some 6 or 7 kilometres, whereas its length cannot be less than 650. Less extensive accumulations of blown sand are found in the oases themselves, in the depressions of Gharaq and Muailla to the south of the Fayûm, and encroaching on the cultivated lands of the Nile Valley between Bahnessa and Mellawi.

The eastern part of the Libyan Desert, in which are situated the Egyptian oases, is itself divisible into three areas having essentially different characters, the northern being an undulating rolling country of sandstones, grits, and gravels ; the central consisting of bare elevated limestone plateaux ; the southern a lower-lying expanse of rugged sandstone, broken only occasionally by ridges and bosses of granite and other crystalline rocks.

The Egyptian oases are deep and broad hollows or depressions in the Libyan Desert plateau. In position they appear to coincide with areas where rocks of comparative softness became exposed at the surface during the gradual lowering of the country by denudation. At such points the general rate of weathering must have become greatly accelerated, with the result that those vast depressions, which form such conspicuous features in the configuration of the country at the present day, were eventually cut out.

Underlying the greater part of the Libyan Desert are porous sandstones, and these, when pierced by deep borings put down from the lower-lying parts of the floors of the depressions, yield abundant supplies of water of remarkable purity. As these sandstones, as well as the shales with which they are associated, have a general dip or inclination from south to north, we are led to infer that they outcrop or come to the surface to the south, so that in all probability the water with which they are so highly charged has its origin in that direction. Whether the water obtains access to the sandstones by direct infiltration of the rains of Abyssinia or the Sudan, from the swamps of the sudd region of the Upper Nile, or from the Nile itself in the Nubian reaches, has not yet been decided with certainty. Recent observations, however, show that far more water is lost in some reaches of the Nile than can be accounted for by irrigation and evaporation, and it seems probable, therefore, that the excess disappears by infiltration into these sandstones.

Little is known of the early history of the oases, though the remains of ancient towns and cemeteries are abundant, and only await systematic excavation by Egyptologists to bring our knowledge of this part of Egypt into line with that of the Nile Valley. That the oases were inhabited in prehistoric times is evident from the occurrence of flint implements of Palæolithic types, both on the margins of the surrounding plateaux and within the depressions, though there is not at present sufficient evidence to

enable us to affirm that the makers and users of these flints were contemporaneous with Palæolithic man in Europe. Implements of Neolithic type, often of finished workmanship, are, moreover, common in places on the floors of the depressions, but it is probable that these were in use well into the historic period.

In historic times the oases, according to Sayce, were governed by Egyptian Kings in the eighteenth dynasty (1545-1350 B.C.), and the oldest monuments as yet found in the oases-depressions date from this period. The most important of the earlier remains belong, however, to the Persian epoch, notably the temple of Hibis near the modern village of Kharga, which was built by Darius. Ptolemaic remains are also known in Kharga, but the greater number of the historical monuments date from the time of Roman occupation, when the oases appear to have attained a considerable degree of prosperity, which continued to Coptic times. Since the Mohammedan conquest of Egypt they have fallen into a state of neglect, and with the consequent diminution of the water-supply the population has decreased, and large areas of formerly fertile country have been absorbed by the surrounding desert.

It is interesting to speculate on the conditions which obtained in Kharga before the first borings were made, as at the present day we cannot point, so far as I am aware, to a single natural efflux of water on the floor of the depression. Surface-

water, of quite a different character from the deep-seated water, is met with at comparatively shallow depths in various localities, and may either represent drainage water from the flowing wells and cultivated tracts, or be water which has escaped from the underground sandstones and found its way to the surface through fissures. Probably it is derived from both sources. In prehistoric times natural springs fed through fissures may have existed here and there within the depressions; and in any case it is probable that prehistoric man obtained sufficient supplies by sinking wells into the upper sandstones, which in some parts of the oasis occur at or near the surface, and contain large quantities of sub-surface or sub-artesian water. Nothing is known as to when flowing wells were first obtained, or by whom the original deep borings were made, and no traces of the implements used have been discovered. Many of these ancient wells, frequently over 120 metres in depth, continue to flow at the present day, although in most cases with a greatly diminished output; a few, however, are still running day and night at the rate of several hundred gallons a minute.

In some parts of the oases water-bearing sandstones occur at or near the surface, and from these beds the Romans obtained additional supplies by the excavation of underground collecting tunnels. Subterranean works of this description are found in all the oases, the most remarkable being in Baharia and at Um el Dabâdib and Jebel Lebekha in

Kharga. They are frequently of great length, cut throughout in solid rock, and connected with the surface above by numerous vertical air-shafts. Many of the latter measure from 30 to 50 metres in depth, so that the construction of these and the horizontal carrying channels must have involved an immense amount of labour.

In Roman times water-stations appear to have been maintained at frequent intervals on the desert roads between the oases and the Nile Valley, and a great development of the water-supply took place. After the Arab invasion, however, no attention seems to have been given to irrigation works, the wells, owing to silting, becoming gradually choked up. As the result of this neglect the water-supply diminished to such an extent that a large portion of the population was compelled to emigrate to the Nile Valley, and even the remaining inhabitants were scarce able to raise sufficient supplies for their maintenance. Within the last fifty years a considerable number of new wells have been made by means of simple hand-boring appliances sent out by the Egyptian Government; most of the new bores have been very successful, but latterly, through want of effective supervision, a great deal of harm has been done by promiscuous boring. Moreover, a very large amount of water is wasted owing to the wells not being fitted with regulating and closing appliances; the water, when not required for irrigation, continues to run, finding its way to the low-lying lands, and forming swamps which

furnish ideal breeding-grounds for fever-carrying mosquitoes.

Within the last year or two this part of Egypt has received renewed attention; extensive boring operations and land reclamation works have been commenced, and the oasis of Kharga has been brought into railway communication with the rest of Egypt.

The floor-level of the oases varies considerably, but in general the cultivated lands lie between 30 and 120 metres above sea-level. The exact area under cultivation is only known very approximately, but it is certain that with an increased water-supply it could be very much augmented. The existing water-supply is totally insufficient to irrigate the available lands, and such portions of the latter as are tilled are generally left fallow in alternate years, and in many cases are only under crops once every four or five years. Now that an attempt is being made to restore the oases to their former prosperity, the question of ownership of land has become of the greatest importance, and it is one bristling with difficulties. As a general rule the wells are owned collectively, the different proprietors having the right to utilize the flow for periods corresponding to the extent of their holdings in the well. Individual shares may amount to as much as one-third or one-half of the well, or be only the merest fraction; in the latter case the small holders combine so as to obtain control of the flow for an appreciable period. Frequently the

whole of the land irrigated by a well is cultivated collectively, the crop on reaping being divided among the owners in portions corresponding to their shares of the water. The question of ownerships is further complicated by there being persons who own water but no land, and by others who claim land but own no water.

CHAPTER II

EARLY RECORDS

Travellers' Names inscribed on the Monuments—Poncet passes through Kharga *en route* for Ethiopia—Browne—Cailliaud's Extensive Researches—Drovetti—Sir Archibald Edmonstone, Bart., discovers Dakhla Oasis—Hoskins—Exaggerated Opinions of Ancients regarding the Oases—Names of Explorers on the Walls of Hibis—Rohlfs' Expedition—Zittel's Geological Work—The words 'Oasis,' 'Wah,' 'Otu,' and 'Set-ament'—A Theban Myth—Dr. Schweinfurth—Brugsch Bey—Captain H. G. Lyons—Government Survey of the Oases—Dr. John Ball.

INSCRIBED on the walls of the ancient monuments in the oasis one frequently comes across the names of travellers who visited the same scenes fifty, a hundred, or even two hundred years ago. Many of these explorers wrote descriptions of their travels and experiences, and such early records are naturally of the greatest interest and importance; unfortunately they are now out of print and somewhat difficult to procure, so that I make no apology for briefly referring to those which I have been able to examine. Most of these early records are extremely quaint, and although they are chiefly descriptive of the personal experiences and impressions of the writers, in some cases numerous observations are

recorded in a sufficiently exact manner to be of permanent scientific value.

A French physician, Monsieur Poncet, who passed through Kharga in 1698, *en route* for Abyssinia, appears to have been the only traveller who left any written records of the Great Oasis between the sixteenth and nineteenth centuries. A translation of the account of his travels was published in English in 1709 ('A Voyage to Æthiopia'). Accompanied by one Hagi Ali, an officer of the Abyssinian Emperor, and by a Jesuit missionary, Father Charles Francis Xaverius de Brevedent, Poncet set out from the town of Manfalut in the Nile Valley, and travelled along the Derb el Arbaîn, the well-known caravan route to the south. His description of this portion of the journey is as follows:

"We set forward on the 2d of October early in the Morning, and from that very Day we enter'd a frightful Desart. These Desarts are extremely dangerous, because the Sands being moving are rais'd by the least Wind which darken the Air, and falling afterwards in Clouds, Passingers are often buried in them, or at least lose the Route, which they ought to keep."

Poncet refers to the oasis as 'Helaoue,' but although his caravan rested there four days, before proceeding to Dongola, via Shebb and Selîma, he makes no reference to the antiquities; in fact, his remarks on this region are extremely meagre. To quote his own words: "We Arriv'd on the 6th of

October at Helaoue; 'Tis a pretty large Borough, and the last that is under the Grand Signior' Jurisdiction. There is a Garrison in it of 500 Janisaries and 300 Spahi's under the Command of an Officer whom in that Country they call Kachif. Helaoue is very pleasant, and answers fully its Name, which signifies a Country of Sweetness. Here are to be seen a great Number of Gardens water'd with Brooks, and a World of Palm-trees, which preserve a continual Verdure, Coloquintida is to be found there, and all the Fields are fill'd with Senna, which grows upon a Shrub, about three Foot High. This Drug which is so esteem'd in Europe, is of no use in the Country hereabouts. The Inhabitants of Helaoue in their Illnesses, make only Use of the Root of Ezula, which for a whole Night they infuse in Milk, and take the day after, having first Strain'd it thro' a Sieve. This Medicine is very Violent, but 'tis what they like and commend very much. The Ezula is a thick Tree, the Blossom of which is blue; it grows into a sort of Ball, of an Oval Figure, full of Cotton, of which the People of that Country make pretty fine Cloth."

Referring to the deserts which surround the oases, Poncet remarks: "Those vast Wildernesses, where there is neither to be found Bird, nor wild Beast, nor Herbs, no nor so much as a little Fly, and where nothing is to be seen but Mountains of Sand, and the Carcasses, and Bones of Camels, Imprint a certain horrour in the Mind, which makes this Voyage very tedious and disagreeable.

It wou'd be a hard matter, to Cross those frightful Desarts without the Assistance of Camels. These Animals will continue six or seven Days, without either eating or drinking, which I cou'd never have believ'd, if I had not observ'd it very particularly." Poncet further relates that he was assured by a venerable old gentleman of his caravan that camels had been known to cover a desert journey of forty days and nights without either food or water. Although it is to be feared that the 'ship of the desert' at the present day is scarcely so abstemious as formerly, we must admit that Poncet's description of the sterility of the Libyan Desert is little, if at all, exaggerated. One may, indeed, travel for hours without seeing bird, beast, or herb ; and even 'the little fly,' which seldom fails to make known its presence for some time after leaving the inhabited districts, generally forsakes one before the caravan has proceeded far into the depths of the desert.

W. G. Browne traversed the same route nearly a hundred years later, passing through the oasis in June, 1793. He relates how he entered the depression at the northern extremity, at the pass known as El Ramlia, and camped at Ain Dizé (probably in the neighbourhood of the modern Ain el Qasr), eight hours' march from Kharga. Browne passed through the depression from north to south, visiting Kharga, Bulaq, Beris, and Maks, whence he followed the usual route to Shebb and Selîma. Like his predecessor, he makes no mention of the antiquities.

Cailliaud, a young French mineralogist, explored Kharga in 1818, and to him we owe the earliest published detailed descriptions and illustrations of the chief antiquities of the oasis. As the existence of important monuments in the oasis was at that time quite unsuspected, Cailliaud's work attracted considerable attention, and his drawings and descriptions were purchased and published by the French Government and dedicated to the King. Cailliaud set out from Esna in the Nile Valley and crossed the Libyan plateau to the village of Jaja. After visiting the most southerly villages of Dush and Beris, he journeyed northwards to Kharga, then, as now, the chief village, whence, on the completion of his researches, he returned to Farshut on the Nile, via Dêr el Ghennîma and the Wadi Samhûd. Cailliaud's observations are almost entirely confined to the archæology of the oasis, and his writings yield little information regarding the villages, wells, and cultivated lands.

The Chevalier Drovetti, French Consul-General in Egypt, visited Kharga the same year as Monsieur Cailliaud. He started from Beniâdi, following the Derb el Arbaîn caravan route southwards, and entered the depression at the northern extremity. Drovetti traversed the oasis from north to south, and proceeded thence to Dongola. Later, on his return journey, he crossed the depression in the opposite direction, eventually returning to the Nile Valley by way of the oasis of Dakhla and the Derb el Tawîl.

A PASS INTO THE OASIS.

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In 1820 Cailliaud again passed through Kharga. He had explored the oasis of Siwa the previous year, whence he travelled, via Baharia and Farafra, to Dakhla, and thence past Ain Amûr to Kharga village. On this occasion no further researches were undertaken in the depression.

Sir Archibald Edmonstone, Bart., accompanied by two friends, visited Dakhla and Kharga in 1819, and constructed a rough but fairly accurate map, showing the relative position of the two oases, with their bounding escarpments and principal villages. Their situation in the Libyan Desert, with regard to the Nile Valley, is, however, greatly in error, being shown fully a degree too far west and nearly half a degree too far north. Edmonstone followed the Derb el Tawîl route from Beniâdi in the Nile Valley to the village of Belat in Dakhla, returning by the Ain Amûr road to Kharga, and thence to Farshut. The major portion of the account of his travels refers to Dakhla, of which oasis he must, indeed, be regarded as the modern discoverer.

Hoskins explored Kharga in 1835, and published a most valuable and engaging account of his travels a couple of years later. This work, entitled 'Visit to the Great Oasis of the Libyan Desert,' contains a number of illustrations depicting the scenery, the chief monuments and their hieroglyphics, etc., made from original drawings and paper casts. Many of the inscriptions are given in full, both in the original and translated into English, and the work of all previous writers and explorers is carefully

summarized. In some cases I have verified the accuracy of Hoskins' drawings by comparing them with photographs taken from the same points, and have been much struck with the insignificant amount of decay which some of the buildings have undergone during the course of over seventy years.

Rizagat, near Thebes, was Hoskins' starting-point, and he entered the depression by the Bulaq pass, crossing the oasis-floor to the eminence known as El Gorn el Gennâh. Surveying the oasis from this point of vantage, Hoskins remarks that the attractions of the cultivated portions of the depression, those

> "Tufted isles that verdant rise amid the Libyan waste,"

are apt to be exaggerated, owing to their great contrast to the surrounding deserts. "The fair appearance then of this oasis is in a great measure fictitious; and has chiefly its origin in the relief afforded to the mind, wearied by the monotony and dreariness of the surrounding wastes. It seems to me therefore, that the only rational way of accounting for the exaggerated epithets which the ancient writers and some modern travellers have applied to this district, is to attribute them to their surprise, at finding in such a fearful region any verdure, any habitable spot, and to the exhilarating effect on the spirits of this agreeable contrast to the dreary deserts which they have just crossed. But comfortless as was my journey through the wilderness, and beautiful as the woods

of palm-trees, doums, and acacias in the Oasis certainly are, still the vivid recollection of the superior loveliness of the banks of the Nile, prevents my consenting to call these regions 'the Gardens of the Hesperides'; and sadly must the oasis have diminished in beauty, if it ever merited the praise which Herodotus bestowed upon the place, in calling it 'the Island of the Blessed.'"

Hoskins, who was accompanied by two other Englishmen, made splendid use of the fortnight spent in the oasis, although unfortunately, just before the termination of his visit, he sustained a violent attack of fever. Their departure is thus described: "After ascending the mountain which bounds the Oasis, we lingered some time at the summit, to take, I may certainly say, our last view of the place; for having, as the Arabs say, got all its antiquities on paper, and having providentially once escaped its pestilential atmosphere, we shall never, I think, by any possibility, have the slightest inclination to revisit such a baneful region."

Most of these early explorers found time to cut their names on the walls of the temple of Hibis, and Cailliaud must have spent hours in this occupation, as he has left a long and neatly executed inscription recording himself as the original and genuine discoverer of that noble edifice. The names of these explorers, who in some cases suffered considerable hardships in visiting the oases, are, however, quite overshadowed by the numberless scrawls made in recent years by a host of otherwise unknown

petty officials of the Government, who have had to take their turn of duty and banishment in the greatly dreaded desert. The dated names cut in the walls of the temple are of some value, as an examination of them frequently yields reliable evidence of the rate of weathering of the stone since the time at which they were inscribed.

It was not until after the winter of 1873-74, when the great German expedition, under the leadership of Rohlfs, with Zittel, Jordan, and Ascherson as geologist, topographer, and botanist respectively, visited all the chief oases of the eastern portion of the Libyan Desert, that any connected scientific observations of importance, other than those dealing with archæology, were published. The Rohlfs expedition astronomically determined the positions of selected points in each oasis, and produced a map on which the principal villages and the approximate limits of the depressions were correctly shown. Zittel at the same time worked out the general relations of the different geological formations found in the country, described their main divisions, and indicated approximately the areas occupied by them. So thoroughly, indeed, did this expedition accomplish its mission that its results have formed a sound basis for all later scientific work in this part of Egypt.

As the voluminous memoirs recording the observations of the members of the Rohlfs expedition are easily obtainable at the present day, it is unnecessary here to do more than briefly

refer to a few of their more general remarks on the oasis of Kharga. In his 'Three Months in the Libyan Desert,' Gerhard Rohlfs states that he and his companions travelled from Dakhla Oasis by the Ain Amûr road, and were greeted at Kharga village by Schweinfurth, who was for the time being residing in a disused alum factory. Rohlfs spent only two or three days in the neighbourhood of Kharga, and remarks that the expedition did not undertake detailed work on the antiquities, as the latter had already been so competently described by Hoskins and other previous explorers; a few corrections and amendments of published accounts of the temple were, however, made. The splendid preservation of the Christian necropolis, with its mausolea of unburnt brick, is remarked upon, and Rohlfs adds that, in beauty and ingenious arrangement, this burial-ground can only be excelled by the necropolis of Cyrene.

Rohlfs describes Kharga village as being pretty from a distance, but remarks that the narrow dirty alleys are the pictures of laziness and poverty; the streets are covered in for protection against the rays of the sun, a common practice throughout the Sahara.

The word 'oasis' is old Egyptian, as also is the Arabic 'wah,' the latter word being also found in Coptic, and signifying an inhabited place; nevertheless, the word 'wah' was never used by the ancient Egyptians to designate the oases. These they called 'otu,' which means a place where

bodies are embalmed. 'Otu' has its origin in the Theban myth, according to which Seth, the murderer of Osiris, was pursued by Horus to Koptos, where he was captured and thrown into a dungeon. His corpse was afterwards found by his friends, and taken to the oases for burial.* The inscriptions on the temple of Hibis in Kharga refer to the oases under the comprehensive name 'Set-ament,' the 'Western Lands.'

About the same time Dr. Schweinfurth, whose services to Egypt in so many branches of science stand pre-eminent, published important contributions on some of the archæological remains. Two or three years later Brugsch Bey brought out an account of the antiquities of the oasis, with translations of a number of the inscriptions on the temples of Nadûra and Hibis. The antiquities will be briefly referred to in my account of the history of the oasis under the Persians and the Romans, and for fuller details the reader is referred to the publications of Cailliaud, Hoskins, Schweinfurth, Brugsch, and some still later writers.

In 1893-94 Captain H. G. Lyons, R.E., in the course of a military patrol, undertaken in order to ascertain the measures necessary to protect the inhabitants of the oasis from possible Dervish raids, made valuable geological observations on the Eocene and Cretaceous systems, especially in relation to the connection of folding and water-supply.

* This legend is stated by Rohlfs, on Brugsch's authority, to be recorded on the temple of Horus at Edfu.

These he discussed in a paper read before the Geological Society of London in 1894, and it was mainly due to the interest it aroused, and to his initiative in pointing out to the Egyptian authorities the importance of having a comprehensive examination of the country carried out, that the Geological Survey of Egypt was established in 1896.

The detailed survey of the Libyan Desert was taken up in October, 1897, and completed in June of the following year, the four oases being mapped on the scale of 1 to 50,000 by plane-table triangulation, checked and adjusted by numerous astronomical observations. Direct measurements by measuring-wheel were also employed to a considerable extent. Baharia Oasis was the first to be taken in hand, Mr. Leonard Gorringe and I taking the western side, and my colleagues, Messrs. Ball and Vuta, the eastern. This plan of splitting up an oasis-depression between two surveying parties was not, however, found satisfactory, and on the completion of Baharia it was decided that Ball should take up the oasis of Kharga, while Farafra and Dakhla fell to my lot. The results of this survey are published in the Memoirs of the Geological Survey of Egypt.

During the last three years I have been fortunate in having had opportunities of studying in some detail the topography, geology, and water-supply of the oasis of Kharga. This detailed examination has enabled me to revise and amplify pioneer work, and has, in certain instances, forced me to differ

from the opinions expressed by my predecessors in the same field, views which, in the light of the evidence available at the time, were doubtless well justified. In the same way may future research necessitate the modification or alteration of the conclusions herein expressed, and for many years to come the region of the oases will offer a vast field for further scientific work.

Before concluding this brief account of the literature on the oasis of Kharga, I should like to take the opportunity of expressing my high appreciation of the energy and purpose of my former colleague, Dr. John Ball, who, in spite of the many hardships and difficulties inseparable from scientific work in the Libyan Desert, in such a short time accomplished so much.

CHAPTER III

THE ROADS LEADING TO THE OASIS

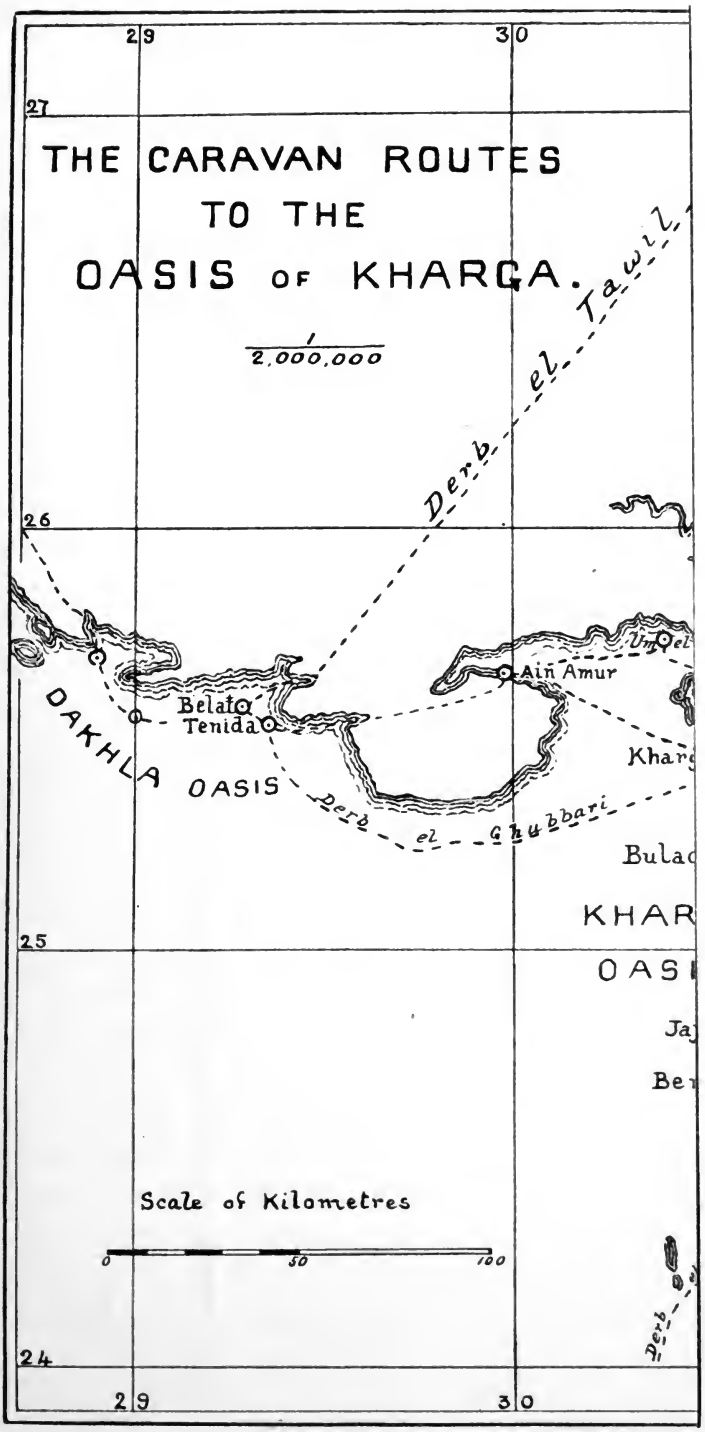
Lines of Communication between the Nile Valley, Kharga, and Dakhla Oasis—Principal Passes out of the Oasis—Ascent to Plateau with Caravans—Main Roads to Assiut, Sohag, Karnak, Esna, and Edfu—Nature of intervening Plateau—Ghubbâri Road to Dakhla—The Upper or Ain Amûr Road—The Railway between the Nile Valley and the Oasis—Nature of Desert Roads—The Bedawin Arabs—Cross-Country Traverses as the Crow flies—Traverse from Farafra to Assiut—Rate of Travelling with Camels.

THE oasis of Kharga is in communication with Dakhla to the west, and with the Nile Valley to the east, by a number of caravan routes, the most frequented of which connect directly with the two villages Kharga and Beris, in the north and south of the depression respectively. Formerly, everyone bound for the oasis was compelled to undertake a four or five days' journey along one or other of these routes, and although nowadays most persons will elect to cross the plateau by train, a description of the oasis would be incomplete without some reference to the desert roads.*

* Reference to the plan showing the different roads and passes out of the oasis-depression will facilitate the perusal of the following pages.

The depression is for the most part bounded by steep and lofty escarpments, quite inaccessible to camels, except at a few points where the gradients are less severe, and the loose blocks of rock and other cliff débris have been removed. The principal passes up the eastern scarp of the oasis are seven in number, the most northerly, known as El Ramlia, being in the extreme north-east corner of the depression. Thirteen kilometres south of this is El Yabsa pass. The next is the Refûf, at the head of the gully 45 kilometres north-east of Kharga village. A little farther south, east of the old Roman fort near the foot of Jebel Ghennîma, one of the two prominent outliers of the eastern plateau, is the pass of Abu Sighawâl, and 35 kilometres to the south is the Nagab Bulaq, N.N.E. of the village of Bulaq. In the south end of the oasis there are passes to the north-east of Jaja, and N.N.E. of Dush. These seven passes are the main exits from the depression on the east side, though there are several other little-used routes, up which lightly laden camels can be taken, for instance, near Jebel Um el Ghennaim. The illustration showing the descent to the depression was, in fact, taken at one of the latter.

Although the roads ascend the escarpments at the best available points, in some cases taking advantage of the easier gradients of the extensive cake-like masses of calcareous tufa, which in places have been deposited over the face of the original cliffs, their ascent with heavily laden camels may at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THE CARAVAN ROUTES
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Scale of Kilometres
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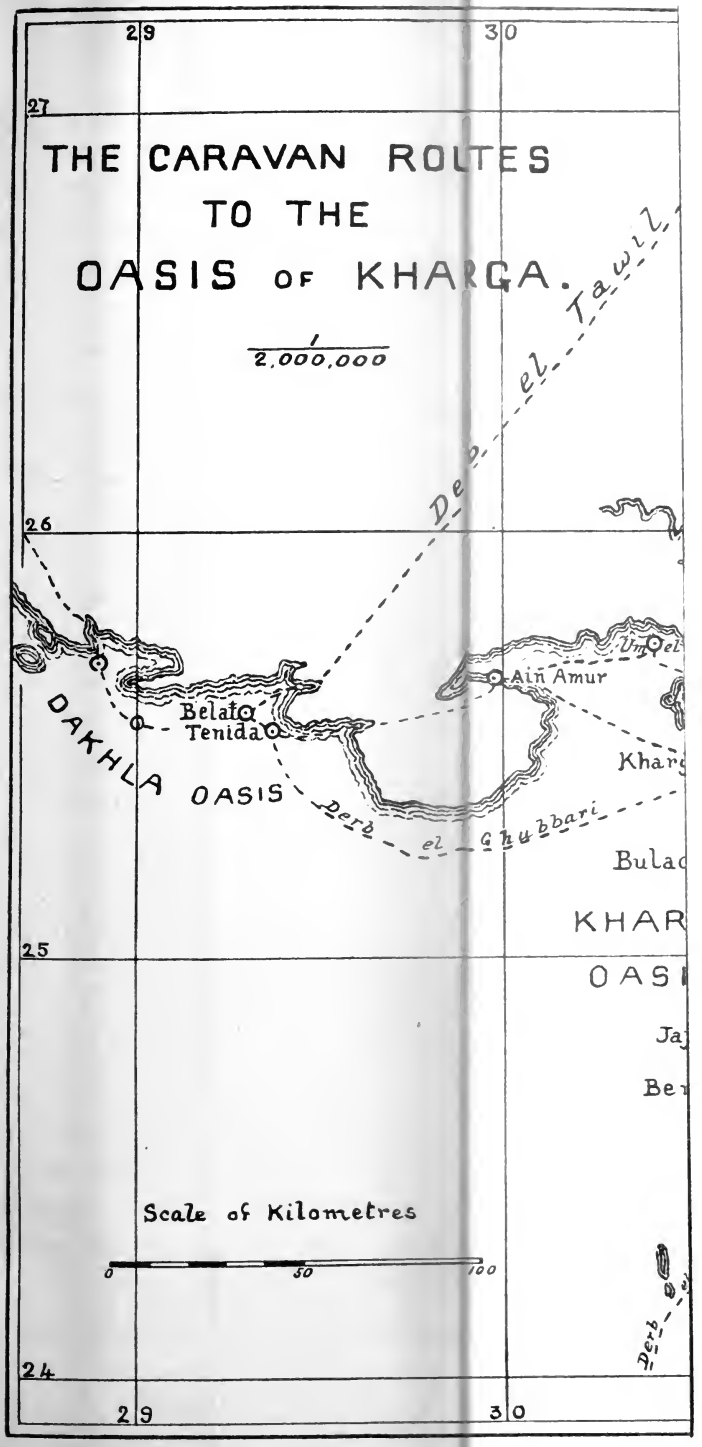
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THE CARAVAN ROUTES
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